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## REMARKS

Claim Objections

Claims 7-9, 15-19, 25, 31, 32, and 36-39 were objected to as being dependent upon a rejected claim, but allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. 10/24/03 Office Action, page 3, paragraph 6.

Claim 25 as filed was in independent form.

Claims 7-9, 15-19, 31, 32, and 36-39 have been rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Accordingly, withdrawal of the objections and allowance of Claims 7-9, 15-19, 25, 31, 32, and 36-39 is respectfully requested.

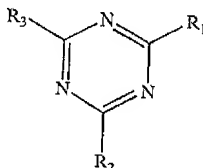
Claim Rejections Under 35 U.S.C. § 103(a) over JP 01-003223 + Klinkenberg

Claims 1-6, 10-14, 20-24, 26-30, 33-35, and 40-44 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over JP 01-003223 B4 in view of U.S. Patent No. 4,039,538 to Klinkenberg et al. 10/24/03 Office Action, page 2, paragraph 3. Applicant respectfully traverses this rejection.

According to the Chemical Abstracts record previously obtained by Applicant and provided to the Examiner, JP 01-003223 B4 (hereinafter "the '223 patent") generally describes a laminate prepared from glass fiber cloth and a resin composition comprising 50-90 parts epoxy resin and 10-50 parts polyphenylene ether with a number average molecular weight less than or equal to 10,000. There is no mention of flame retardants of any kind, let alone Applicant's Claim 1 flame retardant additive that is essentially free of phenolic groups and of epoxy groups and that is a condensation product of (i) a brominated phenol or a mixture of brominated phenols with (ii) a cyanuric halide.

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U.S. Patent No. 4,039,538 to Klinkenberg et al. (hereinafter "Klinkenberg") generally describes a process for the preparation of tris-(halophenoxy)-1,3,5-triazines of the formula



wherein R<sub>1</sub>, R<sub>2</sub>, and R<sub>3</sub> is each a phenoxy substituent having 0-2 alkyl groups, 0-2 halo alkyl groups, and 1-5 halogen atoms. The process comprises contacting cyanuric acid chloride with alkali phenolate of the formulae R<sub>1</sub>Me, R<sub>2</sub>Me and R<sub>3</sub>Me, wherein Me is alkali metal, in the presence of an alkylene diol monoalkyl ether. Klinkenberg abstract. Klinkenberg states that

the flameproofing agents added in accordance with the invention have a strong flame-inhibiting action in polyesters, i.e., condensation products of diols and dicarboxylic acids, such as polyethylenic or polybutylenic terephthalates, polyamides, low-pressure and high-pressure polyethylenes, their mixtures with chlorinated polyethylenes or ethylene-vinyl ester copolymers, polypropylene, polystyrene, ternary copolymers or graft polymers such as those of acrylonitrile, butadiene and styrene (ABS) or methacrylic acid, butadiene and styrene (MBS) and other thermoplastics, and also in thermosetting plastics.

(Klinkenberg, column 4, lines 39-50.) There is no mention of epoxy resins or curing agents for epoxy resins.

Applicant respectfully asserts that a prima facie case of obviousness has not been established because the cited art does not provide clear and particular evidence of a motivation to combine the '223 patent and Klinkenberg. A prima facie case of obviousness based on multiple references requires "a showing of the teaching or motivation to combine prior art references." *In re Dembiczak*, 50 U.S.P.Q.2d 1614, 1617 (Fed. Cir. 1999). The showing of a motivation to combine references must be "clear and

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particular." *Id.* Based on the information available to Applicant, the '223 patent does not mention flame retardants of any kind. And Klinkenberg, while mentioning "thermosetting plastics" at the end of a laundry list of specific thermoplastics, makes no mention of particular thermosetting resins, let alone Applicant's particular epoxy compounds. There is thus no clear and particular motivation to combine the '223 patent and Klinkenberg.

Applicant further respectfully asserts that a *prima facie* case of obviousness has not been established because the combination of the '223 patent and Klinkenberg represents, at best, an impermissible "obvious to try" suggestion. It is well established that "whether a particular combination might be "obvious to try" is not a legitimate test of patentability." *In re Fine*, 837 F.2d 1071, 1075 (Fed. Cir. 1988). Because most research efforts include some element of "obviousness to try," basing patentability on that standard "would not only be contrary to statute but result in a marked deterioration of the entire patent system as an incentive to invest in those efforts and attempts which go by the name of 'research.'" *In re Tonlinson*, 363 F.2d 928, 931 (C.C.P.A. 1966). The present inventor has conducted extensive research on thermoset compositions useful for the fabrication of circuit boards. Such compositions have many property requirements, including excellent dielectric properties, solvent resistance, heat resistance, flame resistance, and thermal expansion properties. Many flame retardants that are effective in increasing the flame retardance of a composition unacceptably and unpredictably degrade one of the other critical properties of the composition. For this reason, one of ordinary skill in the art would not expect a particular flame retardant recommended for many specific thermoplastics and generally for "thermosetting plastics" to perform acceptably in a particular multi-component thermoset composition. The combination of the '223 patent and Klinkenberg thus represents, at best, an impermissible suggestion that it is obvious to try the flame retardants of Klinkenberg in all thermoset compositions, including those of the '223 patent. This is not the standard for obviousness, and a *prima facie* case of obviousness has not been established.

Applicants also respectfully disagree with the Examiner's assertion that it is obvious to add a known ingredient for its known function. 10/24/03 Office Action, page

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2, paragraph 3. The cases cited do not support this proposition. Rather, both *In re Lindner*, 173 U.S.P.Q. 356 (C.C.P.A. 1972) and *In re Dial*, 140 U.S.P.Q. 244 (C.C.P.A. 1964) support a different proposition: that it is prima facie obvious to combine two compositions, each of which is taught by the prior art to be useful for the same purpose in order to form a third composition that is also used for that purpose, especially where the prior art generally suggested the desirability of combinations. See *In re Lindner* at 357 (affirming the obviousness rejection of a combination of prior art dispersants for water-insoluble biocides); and *In re Dial* at 244 (affirming the obviousness rejection of a combination of four prior art stabilizers for halogenated hydrocarbon cleaning solvents). These cases might have been applicable if Applicant were trying to claim a combination of art-known flame retardants. He is not. The examiner has thus failed to offer support for the suggestion that it is generally prima facie obvious to add a known ingredient for its known function.

For all of the above reasons, a prima facie case of obviousness has not been established against Applicant's Claim 1, and Claim 1 is therefore patentable over the combination of the '223 patent and Klinkenberg. Given that Claims 2-6, 10-14, 20-24, 26-30, 33-35, and 40-44 each include or further limit all the limitations of Claim 1, they, too, are patentable over the '223 patent and Klinkenberg.

It should also be noted that many of these claims include limitations that make them further patentable over the cited references. Establishing a prima facie case of obviousness requires that all elements of the invention be disclosed in the prior art. *In re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970).

Claims 6, 24, and 30 include the limitation that the curable composition comprises "a glycidyl ether resin or a mixture of glycidyl ether resins containing, on average, greater than 2 epoxy groups per molecule." Note that the limitation "containing, on average, greater than 2 epoxy groups per molecule" applies to both the glycidyl ether resin and the mixture of glycidyl ether resins. Klinkenberg does not teach epoxy resins of any kind. The '223 patent abstract does not teach or suggest an epoxy resin containing

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greater than two epoxy groups per molecule. The cited references therefore fail to teach the limitation of Claims 6, 24, and 30.

Claim 10 depends directly from Claim 1 and includes the limitation that "said thermoplastic resin has been directly isolated from solution after polymerization." Neither cited reference teaches or suggests this limitation.

Claim 14, via its dependence on Claim 11 and Claim 1, includes the limitation that the thermoplastic resin is a "poly(phenylene ether) [that] has been melt processed at a temperature ranging from about 200° to 350°C." Klinkenberg does not teach polyphenylene ethers of any kind. Although the '223 patent abstract teaches that the laminate was pressed at 280°, there is no teaching or suggestion that the polyphenylene ether used to form the laminate had been melt processed at a temperature ranging from about 200° to 350°C. The cited references thus fail to teach the limitation of Claim 14.

Claims 23 and 43 includes the limitation that the epoxy resin is a "multifunctional glycidyl ether . . . selected from the group consisting of epoxidized phenol-formaldehyde novolacs, epoxidized cresol-formaldehyde novolacs, epoxidized alkylphenol-formaldehyde novolacs, epoxidized 1,1,1-tris(4-hydroxyphenyl)ethane, epoxidized 1,1,2,2-tetra(4-hydroxyphenyl) ethane, epoxidized phenol-dicyclopentadiene novolacs, and epoxidized phenol-benzaldehyde novolacs." Klinkenberg does not teach epoxy resins of any kind. The only specific epoxy resin taught in the '223 patent abstract is a "epichlorohydrin-bisphenol A copolymer" that does not correspond to any of the multifunctional glycidyl ethers recited in Claims 23 and 43. The cited references thus fail to teach the limitation of Claims 23 and 43.

Claims 26 and 44 are directed to laminates that comprise, inter alia, "a metal foil." Neither Klinkenberg nor the '223 patent abstract teach or suggest a laminate comprising a metal foil. The cited references thus fail to teach the limitations of Claims 26, 44, and 45.

Claim 29 includes the limitation that "said flame retardant additive is 2,2'-[(1-methylethylidene)bis[(2,6-dibromo-4,1-phenylene)oxy]]bis[4,6-bis[(2,4,6-tribromophenyl)oxy]-1,3,5-triazine]." The '223 patent abstract does not teach any flame

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retardants. Klinkenberg does not teach or suggest the recited flame retardant. The cited references thus fail to teach the limitation of Claim 29.

Claims 6, 10, 14, 23, 24, 26, 29, 30, 43 and 44 are thus further patentable over the '223 patent and Klinkenberg.

In view of the above remarks, Applicant respectfully requests the reconsideration and withdrawal of the rejection of Claims 1-6, 10-14, 20-24, 26-30, 33-35, and 40-44 under 35 U.S.C. § 103(a) over the '223 patent and Klinkenberg.

Claim Rejections Under 35 U.S.C. § 103(a) over Klinkenberg

Claims 1 and 4 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Klinkenberg. 10/24/03 Office Action, page 3, paragraph 4. Applicant respectfully traverses this rejection.

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing a prima facie case of obviousness. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). Establishing a prima facie case of obviousness requires that all elements of the invention be disclosed in the prior art. *In re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970).

Applicant's Claim 1 recites the presence of "an epoxy resin and curing agent therefor, wherein said epoxy resin is essentially free of bromine atoms." Klinkenberg does not mention any epoxy resins or curing agents for epoxy resins. Klinkenberg thus fails to teach all elements of Applicant's Claim 1. Accordingly, a prima facie case of obviousness based on Klinkenberg has not been established.

Applicant also respectfully disagrees with the Examiner's argument that the flame retardant of Claim 4 is obvious over the flame retardant of Claim 3. The Examiner stated that

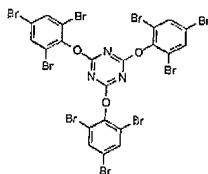
Klinkenberg teaches the compound of instant claim 3 as an art recognized flame retardant for thermosetting composition. Thus the flame retardant of claim 4 would be obvious over one of the preceding claim because it

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has been held that it is obvious that compounds with similar structures will have similar properties. (*In re Gyurik*, 596 F. 2d 1012, 201 USPQ 552 (CCPA 1979).

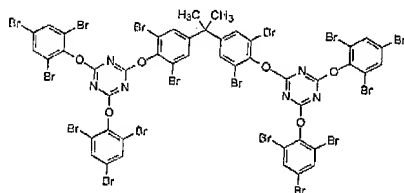
(10/24/03 Office Action, page 3, paragraph 5.) First, the case law cited by the Examiner is inapposite to the rejection. *In re Gyurik* stands for the proposition that "[n]o common-properties presumption rises from the mere occurrence of a claimed compound at an intermediate point in a conventional reaction yielding a specifically named prior art compound." *In re Gyurik*, 596 F.2d 1012, 1018. The rejections at issue in *Gyurik* were explicitly not based on structural similarity. *Id.* at 1017. Although the court expressly avoided any judgment on this issue of structural similarity, *Id.* at 1017, it is noteworthy that some of *Gyurik*'s claims to thio-containing (-S-) compounds were ultimately judged to be nonobvious over references disclosing sulfinyl-containing (-S(O)-) compounds. *Id.* at 1018.

Second, Klinkenberg cannot render obvious the flame retardant of Claim 4, because that flame retardant is not structurally similar to the flame retardant of Claim 3. The flame retardant of Claim 3 is 1,3,5-tris(2,4,6-tribromophenoxy)triazine, pictured below.



The flame retardant of Claim 4 is 2,2'-[(1-methylethylidene)bis[(2,6-dibromo-4,1-phenylene)oxy]]bis[4,6-bis[(2,4,6-tribromophenyl)oxy]-1,3,5-triazine], pictured below.

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Note, particularly, that the two flame retardants vary in molecular weight by about 950 atomic mass units, and that the Claim 4 flame retardant includes a 2,2'-[(1-methylethylidene)bis[(2,6-dibromo-4,1-phenylene)oxy moiety that is unlike any structural element described in Klinkenberg. A presumption of similar properties sometimes arises for structural homologs, i.e., compounds that differ from one another by successive addition of the same chemical moiety. *See e.g. In re Elpern*, 326 F.2d 762, 767 (C.C.P.A. 1964) (stating that the greater the difference in the carbon chain length, the less the presumption of obviousness). However, the flame retardants of Claims 3 and 4 are not homologs. A presumption of similar properties may also sometimes arise for isomers, although isomerism alone is not sufficient to support a prima facie case of obviousness. *See e.g. Ex parte Mowry*, 91 U.S.P.Q. 219, 221 (Bd. Pat. App. 1950). However, the flame retardants of Claims 3 and 4 are not isomers. A presumption of similar properties may also sometimes arise for analogs, such as the substitution of one halogen for another. *See e.g. In re Taborsky*, 502 F.2d 775, 183 U.S.P.Q. 50 (C.C.P.A. 1974) (holding that the substitution of a fluorine atom for a chlorine atom in a salicylanilide compound was not obvious). However, the flame retardants of Claims 3 and 4 are not analogs. In sum, Applicants are aware of no case law supporting a prima facie case of obviousness based on the structural similarity of two compounds as structurally dissimilar as the flame retardants of Claims 3 and 4.

Finally, there is no suggestion in the art of record of a method to produce the flame retardant of Claim 4.

For all of the foregoing reasons, a prima facie case of obviousness based on Klinkenberg has not been established against Claims 1 and 4. Applicant therefore



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requests the reconsideration and withdrawal of the rejection of Claims 1 and 4 under 35 U.S.C. §103(a) over Klinkenberg.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicant. Accordingly, reconsideration and allowance is requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 07-0862 maintained by Assignee.

Respectfully submitted,

CANTOR COLBURN LLP  
Applicant's Attorneys

By: Michael Buchanan  
J. Michael Buchanan  
Registration No. 44,571

Date: January 16, 2004  
Customer No.: 23413  
Telephone: (860) 286-2929